

High Sensitivity Indium Phosphide Based Avalanche Photodiode Focal Plane Arrays, Phase II

Completed Technology Project (2009 - 2010)



Project Introduction

nLight has demonstrated highly-uniform APD arrays based on the highly sensitive InGaAs/InP material system. These results provide great promise for achieving the performance and uniformity requirements necessary to enable 3D LIDAR applications such as autonomous precision landing and hazard detection avoidance. The high degree of uniformity demonstrated offers the potential for biasing the entire APD FPA at a single bias point. This is expected to lead to a dramatic reduction in the complexity of the integrated circuit driver, and allow for scaling to arrays of 256x256 elements and larger. Combined with reduced transmitter power requirements due to high detector sensitivity and low noise, this will ultimately lead to improved compactness, low mass, improved resolution, and low power consumption -- all of which are of concern in NASA applications such as the un-manned Lunar or Mars landing vehicles. In the proposed Phase 2 program, nLight will optimize the performance and demonstrate manufacturability of the highly uniform epitaxy demonstrated in the first phase. These InGaAs APDs are expected to show gains in excess of 10, with very low dark current and noise factors, making them well suited for LIDAR detection. Highly-uniform dense focal plane arrays of various sizes up to 256x256 elements will be fabricated and tested. These arrays will be flip-chip bonded to read-out integrated circuitry for testing in 3D flash LIDAR cameras.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
nLight Photonics Corporation	Supporting Organization	Industry	Vancouver, Washington

Primary U.S. Work Locations	
Virginia	Washington

Project Transitions

 **January 2009:** Project Start

 **September 2010:** Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes